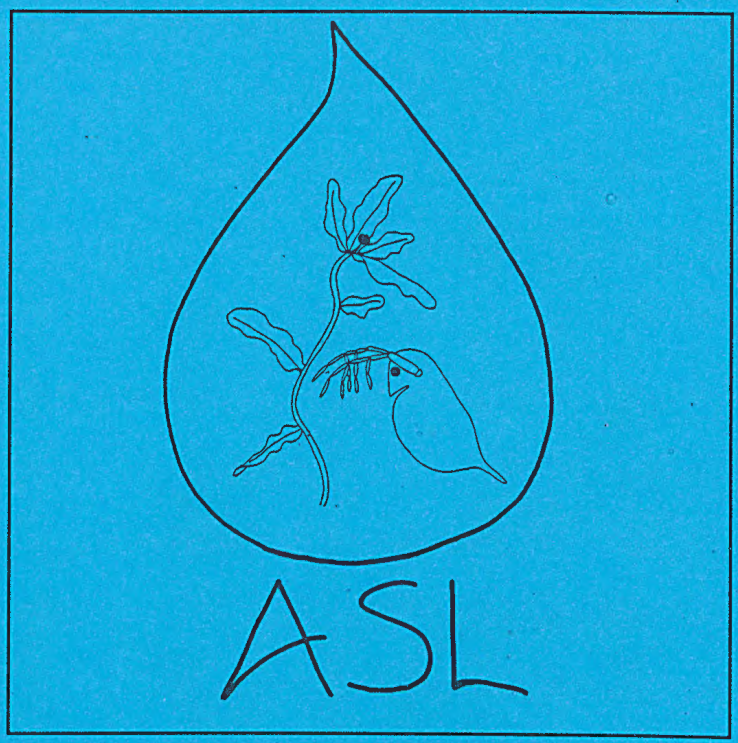
AUSTRALIAN SOCIETY FOR LIMNOLOGY INC

NEWSLETTER



Possible ASL new logo?

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MEMBERSHIP DETAILS

The Australian Society for Limnology Inc. (ASL) is an association of over 400 people with professional or amateur interests related to Australian inland waters. Since its inception in 1961, the society has played an important role in fostering limnology in this country. The ASL promotes liaison between limnologists in academic, government and private institutions and has a vested interest in the conservation of aquatic and related resources. Annual conferences are held near centres of limnological interest, and the programme includes scientific sessions, field excursions and social activities.

The ASL regularly produces a newsletter with notes on limnological activities, articles of general interest, book reviews and announcements of upcoming events likely to be of interest to members. Occasionally, it produces a Special Publication series and a Directory of Members.

Membership applications are welcome from any person with an interest in limnology. Five classes of subscribing membership are available:

Ordinary members	$ 25.00
Student members	$ 12.50
Life members	$200.00
Institutional members	$ 30.00
Sustaining members	Fees on application

Membership covers the period from 1 July to 30 June and all members receive the regular and occasional publications produced by the society. Members may also choose to receive the Australian Journal of Marine and Freshwater Science, the Australian Journal of Zoology and/or the Australian Journal of Botany at special reduced rates. The subscription for each journal is based on the calendar year in which the subscription is paid.

Enquiries relating to membership should be directed to the Membership Officer:

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Material for publication in the March issue of the newsletter should be sent to the editors before 21th of February 1992.

Contributions are welcome on any topic concerned with limnology (or anything else that may be of interest to the readers). Long articles should be forwarded as unformatted text on IBM-compatible discs, or as formatted text in any commonly used word processing package (e.g. WordPerfect, Microsoft Word, Wordstar). All those with Macs, send it to Leon. Camera ready copy can also be sent.

Cover: The cover shows the current leader of the new ASL logo competition (only because it is the only entrant so far). So, unless you want to have this arriving as an ASL letterhead, and have to have it on all the souvenir ASL Inc. mugs, posters and T-shirts, we think you'd better get those graphic-design brain cells in gear. Congrats to JMC of NSW for the early leadership (we won't give her ... sorry, or his ... full name in order to protect the patently guilty).

Editorial

Ah, the end of the year, all those wonderful seasonal songs on the radio - the new Chipmunks play Madonna's Greatest Christmas Hits album lies under the tree. Peace on Earth (well, some of it ... er ... a bit of it). And a big Xmas cheer greeting to all our readers.

Well, it's been a long year, although not as long as some (1988 and 1984 spring to mind as seeming a little longer). The rivers have kept flowing, except those that didn't in the drought, and the lakes have kept being lentic, except those that didn't. Those aquatic invertebrates have kept breeding, despite being sampled over the length and breadth of the land. Water samples were taken, the fish are jumping and the cotton is high. And what about that blue-green algae? What more can you say?

As you may realise (look at your calendar), this issue is a bit later than usual (i.e most of you will have forgotten Xmas already). Whoops! Everyone denies any responsibility for the delay - a combination of field work, other work and various holidays (editors and printers) meant that this issue could not be produced on time. Hence the jokes may seem a little dated. We apologise sincerely for the delay. Well, have a happy Januaury anyway.

So we present the minutes of the annual editorial conference/meeting, held by mental telepathy just yesterday:

Ed1: Declare this meeting open!
Ed2: I declare this meeting open.
Ed1: Any issues to discuss?
Ed2: First issue: who's shout?

[indistinguishable noises like bottles clinking, corks popping etc]

Ed1: Next issue?
Ed2: March (don't you read the index page?)
Ed1: Serious bit now, perhaps?
Ed2: Why not? Well, this is the fourth and final issue of the Newsletter for the year. [Hopefully it will get out this year! - *Eds*] A little shorter than usual but still jam packed with the usual load of old rubbish ... er ... sorry ... the usual brilliant features. Scuttlebutt is still there, and I must say that the contributors are doing a wonderful job. The contributions are full of information, witty, on time and, best of all, on disk. I think we should thank and congratulate all the state (and PNG) correspondents for the top job they've done this year.

[cheering, clapping and indistinguishable noises like corks popping]

Ed1: Hear, here! We should also thank those regular contributors who put time and effort into the production of this "trite" little tome. Russ Shiel for the bibliography (it still gets here despite the occasional sloth/forgetfulness of some members who don't send him any reprints) and Richard Marchant for all the Secretarial stuff.

Ed2: And all those others who have contributed articles on conferences attended or forthcoming, snippets of interest, articles, book reviews etc etc.

[cheering, clapping and indistinguishable noises like corks popping]

Ed1: And all those people who have responded with such enthusiasm to the various requests for opinions on topics important to ASL?

Ed2: Which people?

Ed1: Yeah, could be a bit better.

Ed2: Just a bit. You know, the most popular response topic was over the issue of child care at the conference (*n* responses), followed by the new logo competition (1 response). Things like research priorities, FASTS fees didn't quite get the response we thought they would. Not putting down child care of course.

Ed1: Oh well, maybe next time. Any more business?

Ed2: Should thank the printers.

Ed1: Yeah, thanks to the guys at SAS Printing, Richmond, Melbourne. Do we get a discount now?

Ed2: No, don't think so.

Ed1: Well that's about it for the year. Don't think there's any more business of importance to discuss. More red wine?

Ed1: Don't mind if I do. Meeting adjourned.

EDITORIAL DISCLAIMER

YEA BLUE-GREEN ALGAE!! Yes, remember you read about it first in the ASL Newsletter. Your correspondents and editors beat *The Australian* and the rest of the Kerry Murfax (and their receivers') Empires by over a year with these stories of putrefying toxic cyanobacterial horror (see Vol 28, No. 2 - July 1990, pp. 58-59).

However, the Editors are concerned that rumours have been propagated that we organised these blue-green outbreaks. These rumours are groundless. We do not own a company that sells mineral water nor do we have shares in any companies that do all those whizz-bang GLC analyses or whatever they do to find out whether you can drink it or not.

PRATTLE RUMOUR AND SCUTTLEBUTT

NEW SOUTH WALES

Correspondent: John Hawking, MDFRC, P.O. Box 921, Albury NSW 2640 Ph. 060-431002, Fax. 060-431626.

Sydney Water Board : Scientific Services

The Urban Runoff, River Studies and Stream Studies Sections were heartened to arrive at work one recent morning to find their 'demountable' future home had sprung up fungal fashion overnight. This will relieve the chronic overcrowding in the main building.

Aro Arakel from the Queensland University of Technology has just joined the River Section as Section Leader to coordinate studies on the Hawkesbury-Nepean River. Aro has been involved with hydrological and sedimentological studies of Australian drainage basins in both coastal and inland settings. For the past 4 years he and a group of Australian and overseas scientists have been assessing the sediment and nutrient budgets of selected Queensland river estuaries that discharge to the Great Barrier Reef system. He has particular interest in predictive assessment of salinity in river drainage systems and hopes to commence relevant studies in the Hawkesbury-Nepean System.

Also in the River Section, Simon Williams, Yoshi Kobayashi and John Saunders have started the analysis of historical physico-chemical and algal data for the Hawkesbury-Nepean River. Yoshi is also undertaking studies on zooplankton population dynamics and grazing. Simon is starting a study on the density and distribution of *Microcystis* in the sediment of the Nepean River. John Saunders is studying phytoplankton dynamics and cellular chemical composition of the phytoplankton. Michael Hughes is carrying out studies on the tidal dynamics and sediment transport in the Hawkesbury River. Agnes Cheung is using the HSPF model to simulate the water quality and hydrological behaviour of the catchment and Dali Qin is using the Tideway model to simulate hydrological and biological processes in the river.

Staff changes are rife in Stream Studies Section with more to come. Sharon Rixon has taken up residence at Warrangamba Dam to become a catchment protection officer. Hugh Jones has returned to the fold after a long stint crunching ocean outfall monitoring data, and will be working on nutrient transformations in stream sediments and biota. He and Bruce Chessman have been snorkelling in Wollondilly River trying to figure out how to sample the organic layers on huge boulders in 2 m deep water (any suggestions, gentle readers?). Dianne Flett has joined the section after migrating from Adelaide and is working with Hugh on fluvial nutrient transport. Another newcomer is Jennifer Fuller,

ex Trinity College Dublin, who is looking at the effects of trial regulated flows on the Wingecarribee River. We have also been busy providing visitors (Lilian and Vladimir Matveev) with such entertainments as displays of snake-handling, aerial fire-fighting, and what to do when stranded at the wrong end of Lake Burragorang in a boat with no fuel and no indigenous peoples willing to trade for an outrigger canoe handy.

Your correspondent was unable to prise contributions from the Urban Runoff and Water Resources Sections (shame! shame!) but will try again next time.

Charles Sturt University (Riverina)

Michael Healey and David Thompson were successful in obtaining funds from the "Peter Rankin Trust Fund for herpetology" (Australian Museum) to survey amphibians in billabong habitats. Amphibians are now know to be important indicators of biological change and as the river billabongs are slowly disappearing it was appropriate time to investigate the effect of these changes on the amphibians.

The aim of the survey is to study four local billabongs in or near the southern NSW city of Wagga to determine the amphibians species present. Two billabongs are under urban drainage influence while the remaining two are located near agricultural land. Each billabong will be sampled over spring and summer 1991-1992 using known techniques in amphibian survey. Physical parameters such as air and water temperature, humidity and dissolved oxygen will also be measured during each sampling period. A species list of the amphibians identified will be compiled including information on habitat preferences.

Murray-Darling Freshwater Research Centre

The Centre has entered the race to gain "Co-operative Research Centre" funding and is part of a joint submission with Monash University, Canberra University and CSIRO Griffith. The latest report has the submission among the final contenders.

Rosalind Pontin from Royal Holloway College (University of London) is visiting the Centre for two months on sabbatical leave. Ros is working on resting eggs of Rotifera hatching from sediments in temporary waters on the River Murray floodplain. Rob Cook and John Hawking have commence a project to investigate the impact of sewerage effluent, discharged by the cities of Albury and Wodonga City, on the macroinvertebrates communities in the River Murray.

Paul Boon has been beavering away trying to finish his work on the hydrolysis of organic phosphorus compounds by bacteria in turbid rivers. The project, started in 1988, has started to wear thin, and he is desperate to tidy-up the loose ends to prepare the voluminous data for publication. (Much thanks to Alison Mitchell for tirelessly slaving in

the "Bacterial Ecology Laboratory", otherwise known for a short time as the "Eric Clapton Morphic Resonance Laboratory".) Besides the phosphorus project, Paul has been working with Stuart Bunn on food webs in billabongs. They used the stable isotopes $^{13}C/^{12}C$ and $^{15}N/^{14}N$ to see who was eating who in the famed Albury billabongs: a cursory look at the results indicates that many of our cherished ideas on how wetlands function (especially regarding the role of macrophytes) will have to be thrown on the scrap-heap of outdated and incorrect (but otherwise sweet) ideas. Long live Kuhnian revolutions! And, last of all, Paul's research on the bacterial ecology of rivers and billabongs has finally appeared in *Microbial Ecology*. It shows how the vast range of techniques outlined by Boulton and Boon can be applied to the real world.

University of New England : Botany Department

Currently, the drought none of us really thought we had to have, has driven many and varied lagoon researchers into theses and project writing mode, and into planning new avenues of (aquatic) exploration in the event of a rainy day.

Question: What does Margaret Brock's LWRRDC funding for her new project on wetland seedbanks from lagoons exposed to different wetting and drying regimes and our vanishing lagoons have in common? Now you see it, now you don't! All the best to Margaret in catching the elusive grant.

Results on the survival and longevity of seedlings germinated in field trials are being brought together to form a clearer picture about the processes in our aseasonally fluctuating lagoons. Michelle Casavova received lots of positive(?) and helpful(??) feedback on a pioneering paper into charophyte spore banks as repositories for genetic variation presented to an informal ecology weekend in Armidale in early November. Nevertheless she is unravelling the long-hid mysteries surrounding sexual and asexual reproduction and variation in charophytes, whilst puzzling over the sticky question "are fluctuating, unpredictable environments unpredictable to the researcher or the researchee?!

Congratulations to Dorothy Bell in completing her (Grad.Dip.Sci.) thesis on Phenology of Aquatic Plants in Temporary Lagoons. Never has so much been typed so quickly. Dorothy wishes to advocate the combination of a Mac, a PATN package (or whichever program it was) [don't know] program for cluster analysis and many cups of tea for writing away those spare hours.

Paul Lloyd would like to express his gratitude to Kodak for giving him the only tangible evidence that his Mother of Ducks Lagoon once held enough water to drown a rat in! Not to be discouraged, his paper on the "chemical and hydrological properties of Mother of Ducks Lagoon" at the same ecology weekend was appreciated by all (including Paul).

Having submitted her M.Litt. thesis on the effects of a dam on wet heath communities in Gibraltar Range National Park, North East New South Wales, Ruth Tremont is considering further study (we are not sure if she has incurable wet feet or whether she is heading for land next). Stuart Blanch, in between dabbling with cow's hooves, dead sea eagles and inquisitive copperheads, is examining the responses of wetland plants to grazing and trampling damage by cattle and waterfowl.

Dr Michael Bales and family have recently left "the old country" in search of our much drier pastures. His speciality is in biomanipulation of lake ecosystem food webs. Having worked on phytoplankton problems in the eutrophied Norfolk Broads in England, he is now keen (and in need of) work on our ecosystems.

P.S. LOST!! A good few summer storms. If found, despatch ASAP to UNE Botany Department and associated lagoons.

CSIRO : Division of Water Resources, Griffith

The Rural Water Commission is making its presence felt outside Victoria, being active in Griffith. Joanne Harrison has been seconded for one year to study nutrients/water quality in irrigation areas and will operate out of the Griffith labs. Vin Pettigrove is investigating deformities in chironomids in populations from the main canal and the inflow to Barren Box Swamp in collaboration with Kath Bowmer.

Garry Jones is collaborating with Vladimir and Liliana Matveev to document the trophic relationship between phytoplankton and zooplankton in Carcoar Dam. Jane Roberts is busy planning a workshop on the current research that is in progress on the Murrumbidgee River. She is hoping to commence a study which will examine riparian plant communities and establish any changes under different water regimes.

VICTORIA

Correspondent: Barbara Downes, Dept. of Ecology & Evolutionary Biology, Monash University, Clayton 3168 (Fax (03) 565 5613).

I don't know about all of the rest of you, but things around here have been sensationally busy due to the upcoming field season. More about that later. The following epistle comes from Vince Pettigrove, at short notice I may add. Thanks Vince! (and any other contributors)

"Phill Johnstone, the Cyanofighter and resident jet setter, has recently been playing "African Queen" with Jenny Lidston in an irrigation drainage basin in the Sunraysia. They

discovered that it is awfully difficult doing a macrophyte survey when you can't even get a boat on the water because of the macrophytes!!

If Phill's been a bit hard to catch lately it's because he's usually on a plane.....buzzing Lake Mokoan, "sight seeing" over the Snowy Mountains Scheme, flying to the Sunraysia, up to Canberra again for more nutrient meetings. Our next capital item will have to be a Lear jet (we wish!).

Joanne Harrison, who has moved up in the world from Lake Mokoan to irrigation drainage, is sort of seconded for 12 months to CSIRO. Division of Water Resources at Griffith. She's reviewing nutrient management in irrigation drainage in the Murray-Darling Basin for CSIRO, MDBC, and RWC. Jo spends part of her time at S.W.L., some of her time at Griffith, a fair bit of time visiting various organisations across the Murray-Darling Basin, and heaps of time in a car.

Dick Tozer, the man you called when you needed data from the Victorian Water Quality Monitoring Network, isn't the man to call anymore. He's moving to the bush (well, Tatura) to look at nutrients in irrigation drainage with R.W.C. Investigations Branch. Ross Dunn, the man you now call when you need data from the Victorian Water Quality Monitoring Network, has recently joined us from the State Chemistry Lab for a while. He's usually the only person about when the phones ring and is getting really good at taking messages for everyone.

Rumours have it that the Water Quality Assessment Section at the Rural Water Commission are preparing a travel guide to South-Eastern Mainland Australia. Over the last 6 week, Phil Mitchell and a long list of others have been collecting invertebrate samples from around the state for the EPA Biological Monitoring Network. The good news was that it rarely rained; the bad news is that there's now squillions of samples to be processed.

Vince Pettigrove recently visited Kath Bowmer and Co. at CSIRO, Griffith where he collected chironomid samples from all over the MIA.

A rare winter bloom of the toxic blue-green alga *Anabaena* (which was found to be highly toxic by mouse bioassay) occurred in late July/August at Melton Reservoirs. The toxic avengers from the SWL., Harry Clark and Phill Johnstone, helped to contain the bloom. Results of investigations into causative factor(s) that triggered the unusual bloom are yet unclear.

Kumar Eliezer returned from a summer stay in London and has been busy writing up a report on the effects of nutrient reduction on the macroalgae in Yarrowee Creek."

Downes/Lake/Schreiber Paving Contractors are poised to begin yet another paving exercise, although the target on this occasion is the Steavenson River. The experiment will test the effects of rock pittedness, rock roughness and epilithon on species diversity of invertebrates. Surprise, surprise, bricks are to be used as rock mimics and as a result we now have a nodding acquaintance with masonry drills, brick saws and angle grinders.

The Centre for Stream Ecology hosted several members of a group of biologists and managers from South Africa, who are visiting Australia in the hopes of finding solutions to extremely serious problems with water supplies and environmental degradation in their own country. Staff from C&E, the EPA as well as the Centre attended talks by Fred Van Zyl (Water Quality Management, Dept. of Water Affairs & Forestry), Machiel Viljoen (Dept. of Agricultural Economics, University of the Orange Free State), Willem Gertenbach (Nat'l Parks Board of S. Africa) and Jenny Day (Zoology Dept., University of Cape Town). It is apparent that South African and Australian rivers have much in common - extremely unpredictable hydrological regimes differentiate both countries from the rest of the world. South Africa, however, faces other great difficulties - a rate of population increase of up to 8% in some areas (such as the shanty towns), an inability to provide drinking water in some areas and pressure to build dams on rivers that as yet are relatively undamaged. The South African group are visiting several centres of freshwater research in Australia, so doubtless many readers will meet with them also.

Finally, some news from the Kaila Fisheries Research Station. Somewhat to my embarrassment, I found that both my potential contacts, John Anderson and Sandy Morrison, had long since left the Station - John has gone to Lismore and Sandy Morrison is now at the Marine Science Labs in Queenscliff. Mark Jekabsons gave me an update on activities at the Station instead. Internally-funded projects are suffering presently because of the lack of staff (4 people have left in toto), but work is still proceeding on native fish surveys. He and Warren Blake are trying to determine whether stocking of rivers with native fish are successful and also locate more rivers that could be used for this purpose. Other projects, which are externally funded, include an examination of where and why saline pools intrude into rivers and how to alleviate problems they cause, and a study of whether native fish use floodplains for spawning. This latter project, in its 3rd and final year, is being conducted in the Barmah Forest by Lachlan McKinnon on fish like Golden Perch. Some preliminary evidence suggests that native fish indeed may use floodplains for spawning, a result that will have implications for regulation of flow from the Murray.

Next issue, I should have an update on the present bunfight over relocation, restructuring and re-whatever happening at C&E (Can't wait for that one! The truth will be stranger than fiction -*Eds*).

WESTERN AUSTRALIA

Correspondent: Jane Growns, BES, Murdoch University, Murdoch, W.A. 6150

Murdoch University

Well, guess what? Nothing has happened at Murdoch! A few minor updates but apart from that we're almost dead from boredom.

Jane Latchford is now officially a PhD student. Never mind, Jane. Ivor and Mark are still writing theses. Shirley Balla is hoping to finish in Dec or Jan. Jenny Davis has been involved in *Ribbons of Blue*, a local project by school children on water quality in the Swan/Avon catchment. The report came out recently, so Jenny should have more time now to teach, supervise, advise, run research projects... and apply for lectureships.

Oh, and Pancho Neira will NOT be going back to Chile very soon. You'll have to wait for the next issue to find out why!

The Centre for Water Research (CWR), University of Western Australia

Jörg Imberger recently spent two weeks in Japan. During his stay he carries out measurements of both motion and mixing processes in various lakes and delivered a paper entitled "Limnology and Instrumentation" to the Japanese Society of Limnology at Nara Kinki University. The trip also incorporated a planning meeting for a field experiment to be undertaken in 1993 at Lake Biwa. This is a large international experiment designed and hosted by CWR and Lake Biwa Research Institute. It is expected around 60 international scientists will participate. The aim of the study is to understand the nutrient flux mass within Lake Biwa and so be able to understand and manage a very much increased nutrient into the Lake. We will keep you informed over the next few months.

David Hamilton and Geoff Schladow are currently working on a water quality model project for the Sydney Water Board. The object of the project is to combine a physical mixing model with a water quality model that takes into account algal production and nutrient cycling. This work will be used to assess the impact of the diversion of large freshwater inflows from Prospect Reservoir.

Destratification Projects - CWR recently completed a three year study of artificial destratification of Glennies Creek Reservoir in New South Wales and in eight months hopes to complete the Nepean Reservoir destratification study. Major findings include a new aerator configuration which allows for rapid destratification using a fraction of energy used in previous designs. A simple design methodology has also been prepared which will allow such aerators to be designed for any standing water body.

PAPUA NEW GUINEA

Correspondent: Ross Smith, Ok Tedi Mining Limited, Dakon Road Tabubil, Western Province, Papua New Guinea.

With some coaxing, I have managed to get two other contributions to the PNG news section this time. David Coates writes of the Sepik River Fish Stock Enhancement Project:

The project has progressed from the evaluation to the implementation phase. In 1990 the project recommended that the Sepik-Ramu river basin should be stocked with further species of fish in order to boost subsistence protein supply. A number of species have been evaluated under the code of practice regarding fish species transfers to which the project closely adheres.

The first species to be stocked is *Tilapia rendalli* which was obtained under strict quarantine controls from the Institute of Aquaculture, University of Stirling, Scotland in November, 1990. Fingerlings have been raised to breeding age and stocking on behalf of the government of PNG began in July 1991. To present, 10 stockings throughout the lowlands in the basin have been made and others are planned until the end of 1991. We have no indication if the introduction has been successful as yet. This may not be known for at least another year.

Further activities involve evaluation of suitable species for highlands regions where demand for fish is high but native fish stocks are negligible. The project is particularly keen to seek alternatives to rainbow trout which are presently used for stocking highlands.

The only research activity presently being undertaken is the continuation of census work with a view to determining the socioeconomic benefits of stocking and obtaining base-line pre-stocking data on yields from the basin.

Charlie Ross and Charles Tabua from the Porgera Joint Venture Environment Department write:

The Biology Section's fieldwork is winding down, following the completion of the sampling program for the year. However fieldwork in PNG is never dull. Charles Tabua had his first encounter with a crocodile enmeshed in a net during sampling on the Strickland River. Although the croc was only a baby, 1.5m long, at the time it seemed much larger in the small 4m dinghy. All that kept him from abandoning the dinghy was the thought of larger ones lurking in the muddy Strickland waters.

Matthew Kawei reports another eerie experience at Wapi Village in the Fly River Delta. They arrived to find the village empty. The brave biologists slept on the boat at night rather than in the deserted village. They later found out that the people had moved to another part of Albinio Island to make sago.

Here at Ok Tedi, Andy Maie recently caught his second crocodile in eight years of sampling in the Fly River. It was about the same size as the one caught by the Porgera team, and although it was alive when caught the villager who was helping with the sampling claimed it for skinning. Andy has also caught two freshwater sharks this year. Both have been caught in our largest mesh size gill net, but they were juveniles. Presumably their parents are too big for our nets. A local commercial fisherman has confirmed that he has caught sawfish up to 6.6m long in the Fly. We don't expect to catch such big ones easily as our biggest so far was 2m.

Kayemen Bakowa and I went to the Conservation and Management of Tropical Inland Waters Conference in Hong Kong where we tried to sell the story that PNG has a lot of inland waters with at lot of interesting things to study. Perhaps Paddy Osborne has not had a chance to find any interesting things to study in Oz yet as he presented work he had done in PNG as well. Jim Tait presented his own philosophies on things fishy at the conference of our sister organisation, the Australian Society for Fish Biology, in Hobart.

The slightly salt encrusted section of our Biology Section were well into a trip to establish barnacle and mud clam sampling stations in the Fly estuary and surrounds, when the 25m research vessel they were on started to develop a few faults. The trip ended when the rudders on the Western Venturer decided not to turn to port any more. Fortunately it is a catamaran, so some measure of steerage from the two engines could be maintained to enable them to get back to Daru. I should point out that the Western Venturer is owned and crewed by a shipping company, so the problems were not Barre's fault.

Melinda Day has been seen in the lab sorting samples but all questions regarding her thesis are met with stony silence. Stephen Richards and Greg Johnston are currently here from James Cook University to collect frogs and examine differences between the frog faunas at different altitudes, including the icy heights of Mt Capela.

SOUTH AUSTRALIA

Correspondent: Marcus Brownlow, Botany Department, University of Adelaide.

Botany Department - The University of Adelaide

The aquatic botanists are now reflecting on their year's work with the endorphin rush that completion of Honours theses brings. Giles Flower and Alison Hay have completed detailed vegetation surveys of four south eastern South Australian wetlands, using NTP to determine community structure related to position on the elevation gradient. Giles further compared the use species diversity indices, rank-abundance plots and multivariate analysis for the purpose of identifying different habitat types within wetlands.

Peter Adcock studied the efficiency of three aquatic macrophyte species (*Baumea articulata, Phragmites australis* and *Triglochin procerum*) for the tertiary treatment of sewage. He also compared the growth characteristics of these plants in nutrient-rich Bolivar Sewage Treatment Works, with the comparatively nutrient poor Bool Lagoon. Surprisingly, the plants growing at Bolivar showed restricted growth, and were most likely photosynthesis limited. This affected the overall efficiency of the treatment ponds.

Corinna Lange has started her honours work in earnest with an examination of *Typha* seed germination and seedling recruitment under chaotic (River Murray) and seasonal (Bool Lagoon) water regimes. Tim Kildea completed a study of *Triglochin* seedling establishment and survival requirements under a range of flooding rates at Bool and Hacks Lagoons.

The overseer of the whole operation, George Ganf, did find time for a consultancy with the Australian Heritage Commission to examine two south eastern wetlands for possible inclusion on the Heritage Register, as well as consulting for a NSW wetland retention basin. This did not prevent him from publishing an *Oscillatoria* light absorption paper from work conducted in the UK when on study leave in 1989. [Oooh-aaaah!! Pure Science. Hope Mr Dawkins wasn't watching - *Eds*]

State Water Laboratories - River Murray Wetlands Monitoring Group

Thanks to Bob Congdon of James Cook University for supplying details on how to transfer Commodore 64 files to a PC. Mission accomplished. Editors please note that there is at least one more reader of the newsletter! [Loved at last! - *Eds*]

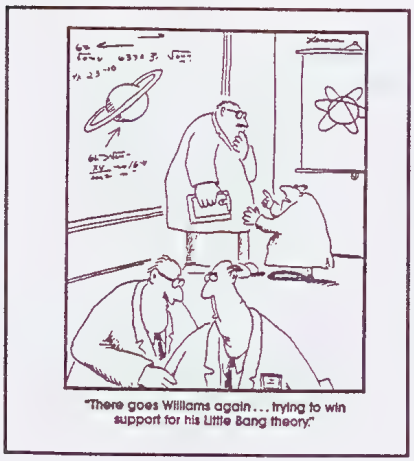
A series of smash and grab raids on aquatic fauna and flora of wetlands along the River Murray in S.A. have been completed (anything to avoid sorting invertebrates). Great excitement at collecting *Plea* among other real animals.

A short period of regression occurred when some interest in rotifers encroached on Phil Suter's time. Justification given by Phil was *Brachionus* greater than 700 µm IS a macroinvertebrate!

Mike Burch and Peter Baker are gearing up for a summer of cyanobacterial blooms, and the opportunities of continuing their work on toxins and taxonomy.

Zoology Department - The University of Adelaide

The critical mass of limnologists in the Zoology Department enjoyed a temporary increase for three weeks before a sudden decrease last week



"There goes Williams again... trying to win support for his Little Bang theory."

In late October we were joined by Dr Christine Campbell, formerly of Memorial University of Newfoundland, St Johns, Newfoundland, Canada who has taken up a post-doctoral research grant (NSERC - National Sciences and Engineering Research Council of Canada) in the Zoology Department with Professor W.D. Williams. After working on "the influence of vertebrate and invertebrate planktivores on zooplankton communities in lakes on the Avalon Peninsula of Newfoundland" for her Ph.D., she now plans to examine predator-prey relationships between invertebrate planktivores and prey in the faunally depauperate inland saline lakes of South Australia.

Our four limno Honours students have handed in their respective theses and vanished from the planet! Andrew Boulton's student Marcus Cooling, in a study of diel and longitudinal variation of the hyporheos below the terminus of Brachina Creek, Flinders Ranges, found some 40 species (mostly new) of invertebrates. Although diel variation in invertebrate numbers was absent, variations in oxygen and temperature were marked below the stream but became dampened with increasing hyporheic residence time beyond the terminus. There were longitudinal changes in hyporheic assemblage composition; ostracods and chironomids below the stream giving way to syncarids and amphipods beyond the terminus.

Keith Walker supervised three students; Stephen Eldridge, in a study of blackbox (*Eucalyptus largiflorens*) on the Chowilla Floodplain, found saline groundwater to be the major cause of declining tree health; Michelle Jenkins investigated the idea that changes in food quality have contributed to the decline of pulmonate snails in the lower Murray;

and, Tim Morris was concerned with habitat preferences and salinity tolerance of the Atyid shrimps (*Paratya australiensis* and *Caridina mccullochi*).

Mike Geddes has recently returned from a brief bout of Study Leave where he visited Western Australia and with the generous assistance of Brenton Knott and Don Edward of The University of Western Australia collected *Artemia* from Yalgarup, Rottnest Island and Shark Bay as part of a study of the electrophoretic identification of the strains/species of *Artemia* in Australia. He also enjoyed a tour of marron country, and a fresh marron lunch, with Louis Evans from Curtin University. Back home he is still working on yabby, fish-zooplankton and brine shrimp manuscripts etc.

Back in September, Paul Boon (MDFRC) and Nick O'Connor joined Andrew Boulton to survey sites in the Flinders Ranges for an intended study on nutrient regeneration by hyporheic microbes. AB then spent 2 weeks in Kakadu confirming that Bob Pidgeon need not be afraid of field work during the dry - sandy stream beds and diverse hyporheos don't mix. OSS provided him and Rachel Paltridge (Honours student) with an excellent hunpy [a what? - *Eds*] although things were sticky at that time of the year.

"For heaven's sake, Andrew!... You're not going to plug that horrible thing in, are you?"

Keith Walker attended the Fifth international Symposium on Regulated Streams held at the University of Montana, Polson, Montana USA in September. The proceedings of which will be published in Regulated Rivers: Research and Management. As an editor for Regulated Rivers, KFW reports that it is going from strength to strength with a respectable backlog of papers from the Australasian region. While in the USA he visited the Snake River Canyon and continued through to Yellowstone National Park.

NORTHERN TERRITORY

Correspondent: Peter Dostine, Alligator Rivers Region Research Institute, Jabiru, NT 0886

Alligator Rivers Region Research Institute

Life has been pretty exciting here lately - I was away at the time, but that's what I'm told (during three weeks in Hawaii, the pleasures of chironomid identification were a dim and distant memory). At ARRI, honours student Rachel Paltridge has commenced a project

on the sources of colonisation of invertebrates in the temporary reaches of Magela Creek. Accompanied by tiger-walker Andrew Boulton (University of Adelaide), Rachel recently surveyed the Arnhem Land reach of the Magela. Despite the best efforts of Dr. Boulton, the hyporheic secrets of the upper Magela are safe for the time being.

Michael Douglas (Monash and NTU) has commenced a PhD project on the effect of forest burning strategies on aquatic communities of lowland streams in Kakadu under the aegis of CSIRO Tropical Ecosystems Research Centre (TERC). Supervisors Drs. Lake and Marchant were here briefly to wind him up and set him in the right direction. We've no recent reports of his whereabouts.

As mentioned in the last ASL Newsletter, and no doubt in the next, Michael Storrs (CSIRO entomology) is here to provide some insight into why the biological control of the water weed *Salvinia molesta* has not met with the expected success. Michael seems to have recovered from his experiment in crocodile attraction in the middle of Ja Ja billabong.

Chris Humphrey reports that the Hong Kong conference "Conservation and management of tropical inland waters: problems, solutions and prospects" was well attended, successful and rewarding, and is looking forward to further meetings. Ex-correspondent Bob Pidgeon has retired in a fit of pique to tie flies for the coming barra season, but still finds some time to analyse the South Alligator fish community data.

NT Power and Water Authority

Simon Townsend reports that Water Resources Division will collaborate with CSIRO TERC in a study of runoff waters from catchments under different burning treatments. Sampling will be done by the aforementioned Michael Douglas. Kevin Bowland is busy at his PC writing his PhD on the comparative limnology of two Mt. Isa reservoirs, a project supervised by the Centre for Tropical Freshwater Research in Townsville. Visitors included Dr. Istitobie, Senior Researcher of the Shimane Prefecture Water Laboratory in Japan.

ANNOUNCEMENTS
or
ALEXEI SAYLE'S LIMNOLOGICAL "STUFF"

RESEARCH OPPORTUNITIES IN PNG

From: Ross Smith, Ok Tedi Mining Limited, Dakon Road Tabubil, Western Province, Papua New Guinea.

For those of you in Australia interested in coming to PNG in 1992, the Cristensen Research Institute will be offering a large number of fellowships in 1992, including return airfares from the scientist's home institute, full board and lodging and logistic support. There is no closing date but you should apply at least 6 months in advance to Dr. Matthew Jebb, the Director, C.R.I., P.O. Box 305, Madang, Papua New Guinea.

NOMINATIONS FOR ECOLOGY INSTITUTE PRIZES

The Ecology Institute of Nordbunte 23, W-2124 Oldendorf/Luhe, Germany (Fax 04132/8883) are seeking nominations for their two prizes. The ECI Prize carries a stipend of US$5000 and is awarded to an ecologist distinguished by outstanding scientific achievement. The winner has to sing for their supper by producing a book to be published in the *Excellence in Ecology* series. The other prize (International Recognition of Professional Excellence) honours a young ecologist (<40 yr) who has published unique research resulting in a scientific breakthrough. Stipend US$750. For further details about making a nomination, contact the ECI at the above address.

ABSTRACTSFOR ASL CONGRESSES

From: Leon Barmuta, Department of Zoology, University of Tasmania

At the last A.S.L. Executive meeting it was felt that mailing out a separate copy of the abstracts of a Congress to all members was too expensive to do routinely. However, it was noted that a number of members have objected to the lack of abstracts in the Newsletter over the past few years. Tim and I discontinued the practice because we wanted to contain costs and diminish the number of trees killed. The numbers of abstracts have increased substantially, and an increasing proportion have been submitted in formats which are difficult to reproduce in our Newsletter format. Indeed, in 1991 a number of abstracts

were submitted in formats wholly incompatible with the instructions. (This sort of irritation we can do without - *Eds.*)

Accordingly a compromise was suggested. All people attending the congress will get their copies of the abstracts as usual. The Newsletter will publish the programme (i.e. titles, authors and contact addresses) of all papers and posters presented in the issue after the congress. People who do not attend the congress, but who do want a copy of the abstracts can write in and ask for a copy which will then be supplied at cost.

The Executive seeks your comments on this suggestion. Please let your local executive member know your views or write to the Secretary or the Editors.

1992 A.S.L.CONGRESS: BRONTE PARK, TASMANIA

The 26th A.S.L. Congress will be held at Bronte Park on the edge of the Central Plateau in Tasmania. The proceedings will run on the weekend after Easter from Saturday 25th April through Sunday 26th April; optional field trips will be run on the following Monday and Tuesday. A variety of excursions are on offer ranging from half-day sightseeing at Lake St. Clair to a more ambitious 2-day jaunt through forest hydrology experiments and a possible cave-gawking special for the troglophiles. Further details of field trips will be supplied with the conference brochure in late January/early February. Contrary to earlier hopes there will not be a pre-conference workshop on Friday 24th April.

Because the conference centre is about 1.5 to 2 hours drive from Hobart, we advise that it would be best for attendees flying into Hobart to do so on Friday. We plan to bus people from Hobart up to Bronte Park and provide busses back to Hobart on the Monday after the conference. People wishing to leave on Sunday should contact the organisers early so that some hapless volunteer can be dragooned into giving you a lift back. Since this will mean that they may well miss the annual Tim Doeg Presentation of the Door Prize Talk, you'd better have a good excuse for wanting to leave early. Seriously though, if you do need to leave early please let us know early too. **No formal arrangements will be made to transport people to or from Launceston or Devonport.**

Two new features of the conference need to be emphasised. **Child care** will be offered for the first time at a conference. A professional service experienced with conferences will be employed for the weekend, and babysitting can be arranged for those wanting to socialise at the Annual Dinner and Sunday "Barbeque". Second, we want to encourage posters at conferences. Accordingly there will be a **one-hour poster session** after morning tea on Saturday when there will be no competing talks, and when poster presenters will be expected to turn up. Students should note that there will be a prize for best student poster. People frustrated by 15 minute talks should also note that posters are an excellent

opportunity to get much more informed (and sober!) feedback than has been possible at recent Congresses.

The format of the Congress will be much the same as it was at Lorne. We will only run two concurrent sessions for talks, and some negotiation may be undertaken if we have more talkers than there is time.

Accommodation at Bronte Park comes in four styles: there are 14-15 hotel-style rooms in the Chalet, 15 cottages ranging from 2 to 4 bedrooms, a 52-bed bunkhouse, and a camping ground for the hardy or those who are combining ASL with a bit of a campervan holiday. The bunkhouse and cottages come with their own kitchen facilities. There is a shop nearby with limited stocks and prices to match.

We hope this is enough information for you to plan early. As mentioned in the last newsletter, there's plenty to see and do in Tasmania, and it is close enough to Easter to contemplate that extended holiday you so richly deserve... Anyway if you need any more information before we finally send out the registration materials and call for abstracts, contact the organiser:

Dr Peter Davies, Inland Fisheries Commission, 127 Davey Street, Hobart, 7000; phone (002) 23 6622; fax (002) 23 4372.

CHILD CARE

Yes, there are readers out there! Thank you to the n (where $n > 0$) people who responded. Respondents included both males and females, parents and non-parents: they were unanimous in wanting child care at Congresses, so we will arrange it for 1992.

As indicated in the article for the 1992 Congress, professional child-care workers will be hired to perform this task, and the presence of cottages at the 1992 venue makes the logistics relatively easy. Since this is the first time we have organised this, early indication of numbers of children likely to attend would be appreciated. When you receive your registration form (in January or early February, we hope!), a prompt reply would help us enormously. At this point we think that the costs can easily be covered by the registration fee. If we get dozens of kiddy-winks, we may have to revise the decision as we would need to increase the number of child-care workers to cope with the load.

If you have any further comments or requests about what should be on offer regarding child care, please contact me (Leon Barmuta) soon. Thank you to everyone who expressed an opinion, and thanks to Sabine Schreiber of Monash University for putting the questionnaire together.

BARMAH FOREST WORKSHOP

Barmah Forest Workshop. 13-14 February 1992. A follow-on from the Bool Lagoon workshop organized by George Ganf . An informal meeting of (basically botanical-type) people to have a poke around the Forest and observe the effects of flooding and water regulation on vegetation and associated zoological and microbiological aspects. Accommodation at the Dharnya Centre. The workshop starts the day after John Hawking's Taxonomy Workshop (Coleoptera) at the MDFRC. Contact Paul Boon (060 431002 by 'phone or 060 431626 by fax) for details.

TOPICS IN THE TROPICS

Limnos in Australia may be interested to hear about the IUCN Wetlands Programme currently running in Central America. Established in 1988, and coordinated by Dr Enrique Lahmann, this group trains scientific and technical personnel in wetland conservation and management, and maintains a central library for use by researchers throughout the region. Dr Lahmann is very keen to hear from Australian limnologists who may be able to send reprints of their work to the library (Documentation Centre). As one of the major drawbacks to research in these areas is related to the paucity of good libraries and accessible reference material, the Centre provides an important resource for wetland researchers in Central America. So package up those reprints and mail them to the address below!

The IUCN Wetlands Programme also provides small research grants (mainly for thesis students) for work on sustainable use and conservation of Central American wetlands, and conducts field demonstration projects of management options for regional water authorities. Research projects currently span a variety of topics in Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica and Panama. If you are interested in more details of these projects, either contact me (is that Andrew Boulton? - *Eds*) or Dr Lahmann. It would be good for ASL members to follow the lead of NABS in helping to support and promote aquatic science in other countries.

Dr Enrique Lahmann, Coordinator, IUCN Wetlands Programme for Central America, PO Box 106, CATIE 7170, Turrialba, Costa Rica.

WONDERFUL NEW BOOKS

Just received in the Editorial office is a copy of "Diseases of Australian Native Freshwater Fishes with particular emphasis on the ectoparasitic and fungal diseases of Murray Cod (*Maccullochella peeli*), golden perch (*Macquaria ambigua*) and silver perch (*Bidyanus bidyanus*)", (aka Fisheries Bulletin No. 4) by Stuart Rowland and Brett Ingram. Now, we realise it's probably not the type of thing to adorn the average coffee table, or take to bed for a quiet read just before dropping off, but it's actually interesting. It is the first major report on the diseases of Australian native freshwater fishes and is based primarily on research conducted at the NSW Fisheries' Inland Fisheries Research Station, Narrandera, since 1978, and the Eastern Freshwater Fish Research Hatchery, Grafton. It was written to serve as a review, and as a practical guide to native fish hatchery operators, fish farmers (settle down, Sam - *Eds*) in the emerging native fish aquaculture industry, and biologists, other fisheries staff and veterinarians involved in the monitoring of diseases and fish kills on farms and in the wild (at least, that's what the letter with the copy said). So if you want to know about ichthyophthiriasis, chillodonelliasis, saprolegniasis or trichodiniasis, give Stuart Rowland a bell at the Eastern Freshwater Fish Research Hatchery, Grafton, NSW 2460; pH: (066) 420420, FAX (066) 447251.

ESTIMATING LOW FLOW CHARACTERISTICS

Just a note advising the readers of the availability of a manual, with floppy disk, to estimate low flow characteristics in ungauged catchments. The aim of the manual is to provide non-specialists with a straightforward description of the steps required to obtain a prediction of a particular low flow characteristic for an ungauged catchment. To aid application of the techniques, a suite of computer programs is included with the manual; the programs are available in either Macintosh or IBM compatible format.

The low flow and yield parameters considered include:

> descriptive statistics of monthly and annual flows
> streamflow recession constants
> flow duration curves for daily, monthly and annual durations
> low flow frequency curves for durations from 1 to 284 days
> duration of low flow spells below a given threshold
> deficiency volumes of low flow spells below a given threshold
> estimate of storage to satisfy a specified draft at a given level of reliability
> a rainfall-runoff model to convert daily rainfall to monthly flow volumes.

Copies of the manual (and disk) are available for $35 from Prof. T.A. McMahon, Dept. Civil and Agricultural Engineering, University of Melbourne, Grattan Street, Parkville, VIC 3052 or pH: (03) 3444000, FAX (03) 3446215 or (03) 3444616

MORE BUTTLESCUTT

NEW SOUTH WALES (continued)

From: Winston Ponder, Australian Museum, 6-8 College St., Sydney 2000

Australian Museum, Sydney

Winston Ponder's small team of snail workers push on with studies on the taxonomy, biogeography, genetics and conservation of hydrobiid gastropods. The main projects involve work on the genetics and morphology of a Recent radiation of hydrobiids at Dalhousie Springs in northern South Australia, the genetics of the south Australian Lake Eyre mound spring snails and the genetics and taxonomy of the hydrobiids of Wilson's Promontory in Victoria where some small scale speciation is being studied in detail. Recently completed is a large project on 60 species of the Beddomeia group from Tasmania and the description of the first Australian freshwater cave-living mollusc. A review of all the hydrobiid genera in the Australasian region is also underway.

Buz Wilson is commencing work on phreatoicid isopods of Australia and he and Winston have just finished a paper describing a weird new isopod from springs in the Kimberleys

Doug Hoese is working on radiations of freshwater gobies of the genera Glossogobius and Morgunda in Australia, New Guinea and Sulawesi.

Plea for help

Winston Ponder is preparing a book on the freshwater molluscs of Australia and would appreciate any information regarding unpublished reports, theses, honours projects etc. that might contain information on the biology, commercial importance, ecology etc. of freshwater (including salt lakes) molluscs. His address is Australian Museum Sydney, P.O. Box A285, Sydney South, NSW 2000. Phone (02) 3398120, FAX (02)360 4350).

RESEARCH AND DEVELOPMENT PRIORITIES: A LIMNOLOGICAL PERSPECTIVE

These are some preliminary notes from Peter Cullen in Canberra used to guide discussions with the LWRRDC on 19th July 1991. Our thanks to Peter for allowing us to publish this; it should provide some food for thought for us all.

Some Principles

In establishing a research portfolio it is clearly necessary to identify industry needs, and these must be seen alongside scientific possibilities. Industry might feel it needs to exploit Mars; the technological capability does not exist yet. Wishes and reality must be balanced. The difficulty here is that managers are interested in what we do know; scientists are much more interested in what we do not know. Effective dialogue is not always easy, since both groups often exhibit intolerance.

A portfolio should be seen as having a mix of research along two axis. There should be a mix of short term and long term. There should also be a mix of low risk and high risk. ASTEC have recently discussed some aspects of portfolio management for environmental research.

As a scientist, I believe you must demand good science. You must ensure you can recognise good science and discriminate it from the pedestrian, the ignorant and the incompetent. Good science is dependent on continuity, on infrastructure and on a mix of competition and collaboration. Good science is embedded in a strong theoretical and experimental context; the days of atheoretical data collection are hopefully over.

Limnology: An Integrating Science Focussing on the Biology of Water

Water quality is now a major issue in Australia. Chemical approaches to assessing water quality have been insufficient to manage water quality, and there is now a realisation that biological approaches are essential if progress is to be made. It is the biological responses in terms of algal growth, fish deaths or sickness in humans that is the core of the public interest.

Biological Assessment

Limnologists are active in attempting to develop ways of assessing the health of aquatic ecosystems by looking at the communities in the water. There are differences in approaches: some argue that fundamental producers such as plants and algae are the key,

others that the communities feeding on these are more important and look at invertebrates or higher up the food chain as integrative measures.

As yet we do not have widely accepted and demonstrated techniques for assessing water quality. This is an active area and a variety of approaches need to be supported until we develop workable tools.

Ecological Processes

Underpinning the applications are more fundamental ecological issues of how aquatic communities react to stress - low flow, high flow, agricultural chemicals, lack of oxygen and so on. We need to predict better how the structure and function of aquatic communities change, and how they recover from short term stress. We need to understand how they transport and transform the contaminants that enter waterways.

Chemical Assessment

Water agencies have spent considerable funds on water quality monitoring with very little return. Much of this money is wasted because of inept science. Short term payoffs can be anticipated from better definitions of objectives, better statistical design, using state of the art data manipulation tools and clarifying appropriate reporting needs to various types of water managers.

Eutrophication

Eutrophication has emerged as a major problem. Much more work is needed on nutrient dynamics at catchment and organism scale. The factors determining algal succession and algae-macrophyte interaction are important. Biomanipulation, where fish-zooplankton-algal relationships are manipulated is an important new approach. More applied topics need to address restoration and treatment options. Much more needs to be done to apply what we now know to reservoir and river management to minimize these problems. The expert system-decision support system approach at CSIRO looks like a useful integrating tool to link what we do know in a form useful to managers.

Human Health Aspects

Some good work is underway at CSIRO in identifying toxins from cyanobacteria, and the work of Professor Falconer at New England on toxicity is important. Further ecological work on the environmental factors causing toxic blooms is needed so that they can be predicted and we can develop some better management tools. Traditional tools like applying copper sulphate have been shown to exacerbate the toxicity problem by releasing toxins into the water.

Protozoan disease organisms like giardia are now a problem in Australia, and we do not have appropriate tools for measuring these organisms in turbid waters. A variety of tools need to be tried including biochemical markers, NMR probes as well as traditional filtering and counting.

I am concerned about the widespread use of alum in water treatment given the fuzzy connection now emerging between aluminium and Alzheimers disease. May not be an issue, but if it gets into the popular press could be a timebomb for the water industry.

Aftergrowth problems and disinfection in reticulation systems continues to be a problem.

Ecotoxicology

We have already invested a lot in ecotoxicology without any obvious pay-off. We should be cautious about any further investment. Organisms in bottles behave in different ways to populations in the varying environment in the field. Laboratory studies are a useful pointer; they will not be a panacea for identifying water quality criteria in my view.

Recognising Systems

Water agencies do not seem to appreciate the connections between catchments, streams and storages, and the quality of water extracted for use. The assumption that water treatment can overcome any catchment mismanagement seems to me simplistic. We need multiple barriers to protect users, not single barriers that can fail. Catchment management is well understood, just rarely used. River management needs more attention since a healthy river may well transfer nutrients to fish rather than keep them as algae with consequential advantages for the storage. Better storage management would provide water with less organic matter and produce less aftergrowths in pipes. This isolation and thinking of small components of the system is limiting the development of improved management practices.

Peter Cullen
July 19, 1991

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ASL 1991 CHRISTMAS CATALOGUE

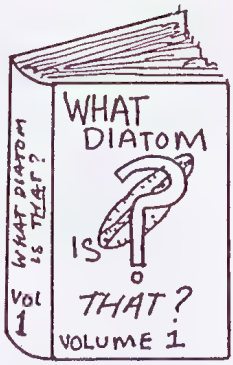
Quality bargains for the discerning limnologist

At last!! Leopard-skin waders from Taxo-scene®. The ultimate in limnological fashion sense, these fully-waterproof waders come with either pink or purple booties. $99.95; please specify shoe-size.

Software Bargains I. It's the end of the year and out they go!! **Mikrosoft Nerd:** the world's most obscure, powerful and dangerous word-processor loaded with features you'll never use: $19.95 (DOS); $345.95 (Mac). **ErrorStat** looks like a reputable statistics package, but gives fun results like negative variances when you least expect it! Comes with SPSS, SAS, or SYSTAT front-end emulator, the ideal gift for that colleague who keeps borrowing your software: $199.99 (Mac only).

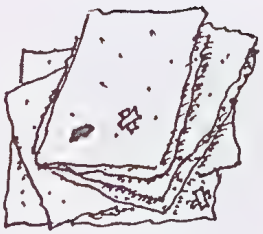
Secchi disk beer mats!! This set of six superb coasters in stylish real-life black & white colors will complement any table setting. Available in practical plastic or heavy-duty field-toughened brass. $19.95 plastic; $154.89 brass.

An algal reference to treasure forever. **What Diatom is that?? Volume 1** is the first of a proposed 345 volume series to be published over the next 2 millenia by the esteemed multinational firm of Dr W. Junck. (Arrangements can be made to mortgage your great-great-grandchildren and all their goods and chattels to pay for the first 25 volumes.)
Vol 1, 695 pp
$U.S. 495.00.



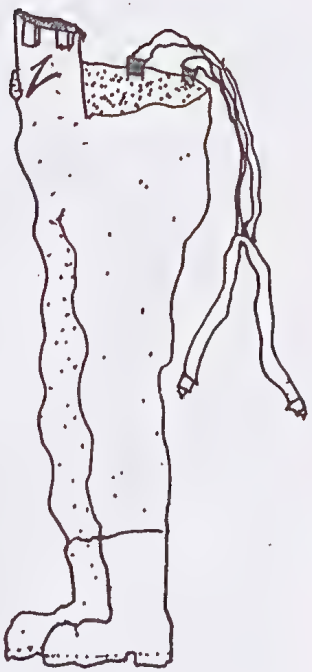
Kids just love these **Party Antennae** from Uniramous Products, the well known sheltered workshop for CSIRO taxonomists forced into early retirement. Erect larval Tanytarsini or long, floppy Leptoceridae models now in stock. Suitable for ages 3-45.
$5.99; one size fits all.

Typha **typing paper** from Bool Products Collective. Carefully handcrafted by impoverished botany students at a well-known southern university, each pack of six sheets has a wrinkled finish that will give your greetings distinction, if only you could write on the stuff. Help these poor students pay for their lap-top computer.
$5.95 per pack.



Software Bargains II. At last, a graphics package that gives you simple scatter plots and line graphs just as you want them in a few easy steps. No, really, we're not joking. It took the directors of **ScatPlot** three years to convince their programmers that the market just wanted something simple. That's why it's $1500.00 for DOS, $3400.00 for Mac and $5.95 for BBC Micro.

They *look* like real waders, they *feel* like real waders, and they *smell* like real waders, but these **Little Zapper Joke Waders** are a real scream when electro-fishing with people you don't like. Covered with squillions of little micro-pores, these waders let just enough water in as a vapour to conduct giga-volts of mirth-inducing electricity when you press the button on your favorite electro-shocker. $125.95; please specify shoe-size. Enquire about bulk prices for classes.

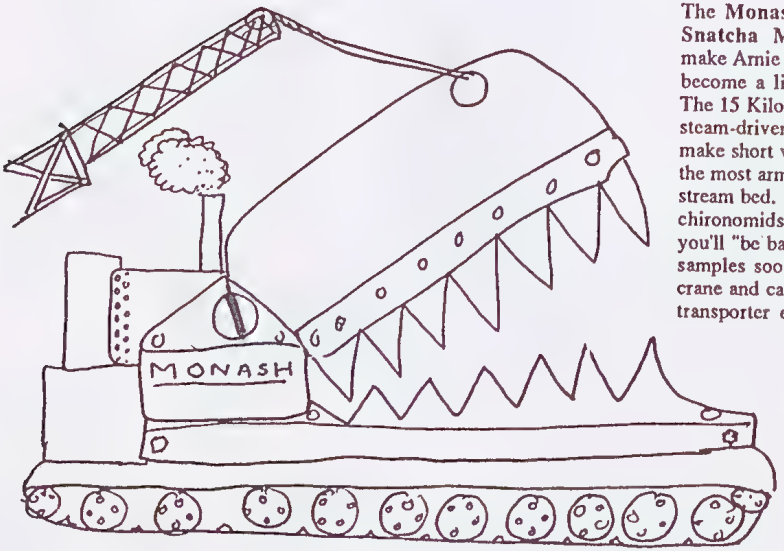


Software Bargains III.

ProposalWrite generates research proposals for all the major granting bodies a limnologist would want to deal with. Random Platitude Generator updated from AWRAC to LWRRDC. $5500.00 (DOS/UNIX/Mac).

MacSack is a timely application for the recession. Polite, pro-forma dismissal notices combined with links to all major accountancy packages facilitate retrenchments at the touch of a mouse. $695.00 (Mac only).

Hours of fun with this challenging **Cyano-bacterial mat jig-saw puzzle.** The subtle colour nuances of this festering mat are the only spatial cues to help you as you assemble this 5000-piece educational marvel. Another quality item from Mokoan Designs. $19.99.



The **Monash Rock-Snatcha Mk X** would make Arnie want to become a limnologist! The 15 Kilo-Newton steam-driven mega-jaws make short work of even the most armoured stream bed. Let those chironomids know that you'll "be back" for more samples soon!! $3600; crane and caterpillar transporter extra.

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